Analysing and Mapping Cited Works: Citation Behaviour of Filipino Faculty and Researchers

Marian Ramos Eclevia[1] and Rizalyn V. Janio[2]

[1]De La Salle University
[2]University of the Philippines Diliman

Abstract: Scholarly literature on citation studies has focused on understanding the relationship of two articles through citations and measurement of citation counts of an article; thus, citation behaviour in a simplified, linear relationship. Citing of sources involves complex behaviours which are influenced by a variety of subjective factors. This study identifies and describes the citing behaviours of faculty members of Ateneo De Manila University, De La Salle University, and University of the Philippines. Using ISI Web of Science and Scopus, a citation analysis was conducted on 8,652 English language journal articles published in 2007-2015. Citation Content Analysis (CCA) for syntactic and semantic analysis of contents, developed by Guo Zhang, Ying Ding and Staša Milojević CCA was also performed on single-authored articles of Filipino faculty members published in 2007-2015. The results of this study can yield valuable insights on how Filipino researchers cite sources which may be used for library collection development.

1. Introduction

Scholarly literature on citation studies has focused on understanding the relationship of two articles through citations and measurement of citation counts of an article (Shadish, W. R., Tolliver, D., Gray, M. and Sunil K. Sen, G., 1995; Gao, S., Yu, W. and Webster, B. M., 2007; Ashman, A. B., 2009; Currie, L. and Monroe-Gulick, A., 2013; Larivière, V., Sugimoto, C. R. and Bergeron, P., 2013; Stephens, J., Hubbard, D. E., Pickett, C. and Kimball, R., 2013); thus, citation behaviour in a straightforward, linear relationship (Zhang, G., Ding, Y., and Milojević, S., 2013). Little attention has been given to complex behaviours involve in the act of citing (Milojević, S., 2012). Zhang, Ding and Milojević (2013) defines citing as "a rational, selective, and comparative way to make best

"economic" benefit (p. 1495) as it increases the probability of getting cited and accepted while decreases the risk of rejections and cost.

The study aims to analyse the citation counts of journal articles written by Filipino faculty and researchers, examine the information resources used by faculty, and analyse the citing behaviour of the faculty using Citation Content Analysis (CCA). The results of this study can yield valuable insights on how faculty members cite materials which may be used for assessing the adequacy of library collections to support teaching and research programs of academic institutions.

2. Research Methods

Journal articles written by faculty members affiliated with the ASEAN University Network (AUN) members in the Philippines: Ateneo De Manila University (ADMU), De La Salle University (DLSU), and University of the Philippines (UP) (including its seven campuses: Diliman, Manila, Los Banos, Baguio, Visayas, Mindanao, Open University) and published in academic journals indexed in ISI Web of Science and Scopus from 2007-2015 were extracted. Using Web of Science and Scopus, a citation analysis was conducted on 8,652 English language journal articles published in the last nine years. To analyse the citation behaviour, the current authors adopted CCA developed by Zhang, Ding and Milojević (2013). For syntactic analysis, cited references were analysed in terms of relation to the citing work, location, frequency, and style of mentioning. For semantic analysis, cited and citing works were further examined based on the function and disposition of citation as well as type of research domain and focus. Of the 1,012 single-authored articles, cited references of 101 randomly selected titles were analysed using CCA. Only single-authored articles were considered in this study as they are the sole responsible for the contents of the article.

Full text articles were downloaded from various online databases subscribed by DLSU and UP Diliman. All full text articles were examined to determine whether articles met all of the following criteria: written by a single author from ADMU, DLSU or UP; published between 2007 and 2015; have a list of references regardless of citation style; and must be characterized as feature article. Nineteen (19) out of 101 articles were excluded as they are reviews of books. A total of 82 articles were left for content analysis.

3. Results and Discussion

3.1 Faculty Research Productivity

A total of 8,652 journal articles (4,259 in WoS and 4,393 in Scopus) were written by faculty and researchers of ADMU, DLSU and UP which were published in 3,509 journals indexed by Web of Science (1,746 titles) and Scopus (1,763 titles) between 2007 and 2015. The average number of articles published per annum is 961. The most productive year is 2015 where a total of 1,305 articles (602 articles in WoS and 703 articles in Scopus) were published. Raymond Tan (237 articles, h-index of 31) and Consolacion Ragasa (180

articles, h-index of 13) of De La Salle University are the top two most productive authors in Web of Science and Scopus. The majority of the articles were written by UP faculty and researchers. High research productivity at UP may be associated with the fact that it is the national and research university of the Philippines. Also, UP has a bigger size of faculty members, large numbers of research centers, and more funding. The most studied research areas are education, business and economics, constituting the 26% of all citations. Moreover, 65% of the total articles are available online.

3.2 Citation Counts of Journal Articles
Table 1 presents the distribution of citation counts of journal articles by year. As of March 2016, journal articles in this study yielded a total of 66,613 citation counts in Web of Science and Scopus. An average of 7,401 times cited per annum was recorded. On the average, each article has been cited 15 times. Articles published in 2009 yielded the highest number of citation counts (total of 13,227; average citations per year, 1,890; and average citations per article, 34). Articles published in *The Lancet* (5,234 counts), *New England Journal of Medicine* (4,396 counts) and *Science* (2,911 counts) earned the top three highest citations.

Table 1 Year-wise Distribution of Times Cited

Publication Year	Total Times Cited Count			Average Times Cited Per Year			Average Times Cited Per Article		
	S	W	S+W	S	W	S+W	S	W	S+W
2007	4,553	3,804	8,357	506	423	929	18	12	30
2008	4,930	4,363	9,293	616	545	1,162	14	11	24
2009	7,259	5,968	13,227	1,037	853	1,890	20	14	34
2010	6,457	5,680	12,137	1,076	947	2,023	16	12	28
2011	4,081	4,400	8,481	816	880	1,696	8	9	17
2012	3,136	2,837	5,973	784	709	1,493	6	6	12
2013	2,393	2,339	4,732	798	780	1,577	4	4	8
2014	1,795	1,481	3,276	898	741	1,638	3	3	6
2015	806	331	1,137	220	331	1,137	1	1	2
Total	35,410	31,203	66,613	3,934	3,467	7,401	8	7	15

Legends: S = Scopus   W= Web of Science   S+W=Total citation counts

3.3 Formats of Cited References

The sample population of 82 journal articles contained a total of 2,367 cited references (see Table 2) of which 18.2% are from articles written by ADMU faculty and researchers, 22.2% from DLSU and 59.6% from UP. Similar to the findings of Dewland (2011), faculty and researchers generally cited journals articles (50.1% of the total cited sources). Of the cited journals, 218 articles are online journals from various subscription and open access databases. In general, the average number of cited references per article is 30. ADMU's faculty and researchers tend to cite more references than of those in DLSU and UP.

Table 2 Format-Wise Distribution of Cited References

	ADMU (n=431)	DLSU (n=526)	UP (n=1,410)	Total (N=2,367)
Material Types Cited				
Journal articles	243 (10.3%)	245 (10.4%)	697 (29.4%)	1,185 (50.1%)
Books/book chapters	106 (4.5%)	182 (7.7%)	503 (21.3%)	791 (33.4%)
Web documents	18 (0.8%)	50 (2.1%)	77 (3.3%)	145 (6.1%)
Report/news	44 (1.9%)	32 (1.3%)	57 (2.4%)	133 (5.6%)
Conference papers	7 (0.3%)	10 (0.4%)	24 (1.0%)	41 (1.7%)
Government documents	8 (0.34%)	0	23 (1.0%)	31 (1.3%)
Theses/Dissertations	3 (0.1%)	2 (0.1%)	20 (0.8%)	25 (1.1%)
Others	2 (0.1%)	5 (0.2%)	9 (0.4%)	16 (0.7%)
Range of References	5-132	4-62	2-70	5-132
Mean References/Article	36	27	28	30

3.4 Age of Cited References

As shown in Table 3, age of the citations ranged from -1 for papers appearing online early (one year ahead of publication) to 143 years old publication. The oldest source cited was published in 1869 (*Die Philippinen und ihre Bewohner. Sechs Skizzen*) and the latest was from 2015. The average recency of the entire cited sources is 12.22 years, which indicates that, on average, Filipino authors cited sources that were published 12 years ago. The overall average publication date was 1997 with a modal of 2004. DLSU faculty tend to cite more recent sources.

3.5 Highly Cited Journals

A total of 666 unique journals were cited by the faculty and researchers being studied. Results reveal that *American Economic Review* (14 counts) and *Journal of Personality and Social Psychology* (13 counts) are the top two highly cited journals. Both journals belong to the Q1 in the Scientific Journal Ranking (SJR). The top 20% of journals cited account for 48.9% of the total journal citations. Note that the top 20 journals composed of 14.6% of the total journal citations. In addition, 452 journals having only one citation each constitute 38% of the total cited journals. Thus, analysis of cited journals in this study does not adhere to the 80/20 rule.

Table 3 Age of Cited References

	ADMU (n=431)	DLSU (n=526)	UP (n=1,410)	Total (N=2,367*)
Publication Year				
1869-1950	1 (0.04%)	2 (0.1%)	42 (1.8%)	45 (1.9%)
1951-1999	178 (7.5%)	195 (8.2%)	630 (26.6%)	1,003 (42.4%)
2000-2010	225 (9.5%)	300 (12.7%)	653 (27.6%)	1,178 (49.8%)
2011-2015	27 (1.1%)	29 (1.2%)	82 (3.5%)	138 (5.8%)
Age of Cited Sources				
-1 to 5	122 (5.2%)	198 (8.4%)	370 (15.6%)	690 (29.2%)
6 to 10	89 (3.8%)	121 (5.1%)	328 (13.9)	538 (22.7%)
11 to 99	220 (9.3%)	207 (8.7%)	683(28.9%)	1,110 (46.9%)
100 and above	0	0	26 (1.1%)	26 (1.1%)
Publication Year of Cited Journals				
Mean	2000	2000	1996	1998
Mode	2009	2005	2004	2004
Oldest	1972	1965	1870	1870
Latest	2013	2011	2015	2015
Publication Year of Books/book chapters				
Mean	1998	1996	1990	1993
Mode	2010	2005	2005	2003
Oldest	1943	1952	1882	1882
Latest	2012	2011	2014	2014

* 3 cited references have no date of publication

3.6 Syntactic Analysis of Cited References

The frequency, location and style of mentioning were manually calculated to examine the distribution of cited references in the full text articles. Note that 98

cited references were not mentioned anywhere in the text. These references may be considered less relevant and less important citations. As presented in Table 4, cited references are mostly located in the sections of literature review and results/discussion. Cited books/book chapters usually appeared in the literature review while cited journals are generally positioned in the results and discussion section. As mentioned earlier, all journal articles included in the content analysis were single-authored; hence, no mention for parallel or cite-coauthor papers.

Overall, only 2.0% of all cited sources were self-citations from 40 unique articles. Articles in the Social Sciences tend to self-reference more than the rest of the sample. The majority (73.6%) of the entire citations were mentioned only once in the text. A few cited references were mentioned more than eight times. In terms of style of mentioning, 91% of all citations were classified as "not specifically mentioning." This style of mentioning are distributed in the literature review and introduction. "Specifically mentioning but interpreting" and "direct quotations" are generally located in the results and discussion section.

Table 4 Syntactic and Semantic Analysis of Cited and Citing Sources

Function of Mentioning (Cited Source)	# of Citations
Provide background information	1,545
Provide previous empirical/ experimental evidence	498
Construct theoretical framework	216
Describe challenges and limits	123
Disposition of Citation (Cited Source)	
Positive	2,065
Negative	113
Mixed	91
Research Domain (Citing Source)	
Social Sciences	1,635
Applied Sciences & Engineering	286
Humanities	246
Natural Sciences	200
Research Focus (Citing Source)	
Empirical research	1,223
Descriptive research	850

Theoretical research	107
Experimental research	56
Exploratory research	46
Evaluation research	27
Narrative	26
Mathematical research	23
Case study	9

Location of Citations	# of Citations
Literature review	1,132
Results/discussion	1,002
Introduction	842
Methodology	353
Conclusion	98
Notes	32
Appendix	16
Abstract	6
Theoretical framework	5
Relation to the Citing Author	
Parallel (cite-coauthor)	0
Reciprocal (self-citation)	60
Frequency of Mentioning	
Once	1,741
2 to 4	478
5 +	50
No mention	98
Style of Mentioning	
Not specifically mentioning	2,165
Specifically mentioning but interpreting	80
Direct quotation	35

3.7 Semantic Analysis of Citation Content

Sixty-two percent (62%) of the cited sources provide background information (see Table 4). This function of citation was most frequently placed in the introduction (521 mentions) and results/discussion (509 mentions). As expected, all citations that "provide previous empirical/experimental evidence" appeared in the results and discussion section of articles in order to present relevant findings of previous studies and support the newly found results. Cited references that describe the challenges and limits are also found in the methodology and results/discussion sections. They generally introduce and discuss the scope, limitations, and methods of the study. The general disposition of citations is positive, with total citations of 2,056 (87.2%). Faculty and researchers mentioned sources in their articles to acknowledge the existence of some other works in the field, recognize the cited sources as a classic and therefore must be cited, and confirm the findings of related literature.

Of the 82 articles, 57 (69.5%) are classified as Social Science. The least number of articles was the Natural Sciences domain (only five articles). Articles in the Social Sciences held 69% of the total citations. Moreover, authors in the Natural Sciences tend to cite more sources (40 citations per article) than those of in the Social Sciences (28 citations per article). They also have conducted more empirical research than experimental research. Note that descriptive studies contain more references than empirical studies.

4 Conclusion

Evidently, research productivity of Filipino faculty members has been consistently growing for the last nine years. Academic institutions like ADMU, DLSU and UP have directed their focus on becoming research universities and instituted various programs to improve their research productivity towards achieving a set research agenda. The influence of faculty scholarly outputs was evident as indicated in the average citation counts per year.

Significant differences in citation behavior among faculty and researchers of ADMU, DLSU and UP have been observed. They are inclined to reference journal articles than books/book chapters. Also, they have utilized the available subscription and open access databases. On average, cited references are 12 years old. Substantial numbers of citations are less than five years of age. Generally, faculty members cited journals with high impact factors and SJR.

Cited sources were most frequently located in the introduction section of the journal articles to provide background information and were mentioned only once. Filipino authors also cite references in the results and discussion to provide empirical/experimental evidence and define the limits and challenges of the study.

The procedures involved in the citation content analysis were very tedious and time consuming considering the size of the journal articles being examined. However, results of content analysis provided a better understanding of the citation behaviour of Filipino faculty and researchers more than what citation counts may offer. In conducting CCA, it was quite difficult to classify cited references according to function and disposition of citations. Syntactic analysis is a lot easier than the semantic analysis of citation content. Moreover, to maintain the reliability of classifying citations, one has to be well-versed with use, scope and limitations of various research design and methods to identify the research focus of citing articles.

For future research, it is strongly recommended that similar study must be conducted focusing on specific discipline such as Applied Sciences and Engineering but not limited to journal articles.

References

Ashman, A. B. (2009). An examination of the research objectives of recent citation analysis studies. *Collection Management*, *34*(2), 112-128. doi:10.1080/01462670902725885

Currie, L., & Monroe-Gulick, A. (2013). What do our faculty use? An interdisciplinary citation analysis study. *The Journal of Academic Librarianship*, *39*, 471-480. doi:10.1016/j.acalib.2013.08.016

Dewland, J. C. (2011). A local citation analysis of a business school faculty: A comparison of the who, what, where, and when of their citations. *Journal of Business & Finance Librarianship, 16*(2), 145-158. doi:10.1080/08963568.2011.554740

Gao, S., Yu, W., & Webster, B. M. (2007). A longitudinal investigation into the changing citing behavior of geomatics postgraduate students at Wuhan University, China, 1988–2004: Implications for collection development. *Library Collections, Acquisitions and Technical Services*, *31*, 42-57. doi:10.1016/j.lcats.2006.12.001

Larivière, V., Sugimoto, C. R., & Bergeron, P. (2013). In their own image? A comparison of doctoral students' and faculty members' referencing behavior. *Journal of the American Society for Information Science & Technology, 64*(5), 1045-1054. doi:10.1002/asi.22797

Milojević, S. (2012). How are academic age, productivity and collaboration related to citing behavior of researchers?. *Plos ONE*, *7*(11), 1-13. doi:10.1371/journal.pone.0049176

Shadish, W. R., Tolliver, D., Gray, M., & Sunil K. Sen, G. (1995). Author judgements about works they cite: Three studies from psychology journals. *Social Studies of Science*, *25*(3), 477-498

Stephens, J., Hubbard, D. E., Pickett, C., & Kimball, R. (2013). Citation behavior of aerospace engineering faculty. *The Journal of Academic Librarianship, 39,* 451-457. doi:10.1016/j.acalib.2013.09.007

Zhang, G., Ding, Y., & Milojević, S. (2013). Citation content analysis (CCA): A framework for syntactic and semantic analysis of citation content. *Journal of the American Society for Information Science & Technology*, *64*(7), 1490-1503. doi:10.1002/asi.22850